

## PATENT ABSTRACTS OF JAPAN

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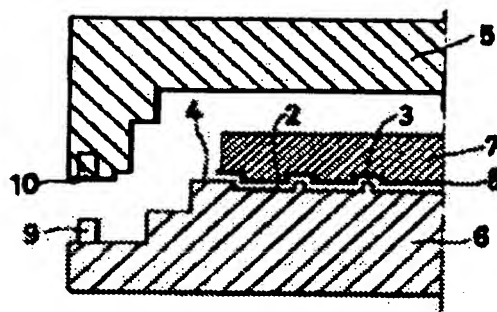
### (54) PRODUCTION OF DECORATED MOLDING

#### (57)Abstract:

**PURPOSE:** To prevent a resin component from flowing to the surface of a decorative sheet when a decorative sheet laminated molding having a design such as a free pattern or color is produced by providing a smooth part to the upper surface of a lower mold at the outer peripheral position of an uneven part and placing the end part of the decorative sheet on the smooth part.

**CONSTITUTION:** After an upper mold 5 is heated to 140° C and a lower mold 6 is heated to 150° C, a decorative sheet 8 is placed on the upper surface of the lower mold 6 so that the end part thereof is positioned on the smooth part 4 of the lower mold 6 and an SMC molding material 7 cut in a predetermined size is placed on the decorative sheet 8. After the upper mold 5 is brought into contact with the SMC molding material 7, the upper mold 5 is allowed to fall at a speed of 2mm/sec to complete mold clamping and, thereafter, pressure molding is performed for 240sec under pressure of 70kg/cm<sup>2</sup>.

Subsequently, the upper mold 5 is opened to demold a decorated molded product of a waterproof pan wherein an embossed pattern surface and narrow joints are applied to the bottom part thereof and a smooth part is formed to the outer periphery thereof. Therefore, an inferior product is hard to generate and the decorated molding is obtained with high molding efficiency.



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**CLAIMS**

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[Claim(s)]

[Claim 1]By laying a decorating sheet on a bottom part which has an uneven part for product embossed surface formation on the upper surface, laying a thermosetting molding compound on this decorating sheet, and carrying out heating compression, where these are inserted by bottom part and a punch, A manufacturing method of a mold decorating article being the method of manufacturing a mold decorating article, providing smooth sections located in the upper surface of a bottom part at a periphery of the above-mentioned uneven part, and laying an end of a decorating sheet in these smooth sections.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[Industrial Application]By matching a decorating sheet and a thermosetting molding compound in piles in a metallic mold, and performing heating compression molding, this invention makes a decorating sheet and a molding material unify, and relates to the method of manufacturing the mold decorating article which revealed the various designs which have a desired pattern or color with a decorating sheet.

[0002]

[Description of the Prior Art]Although the method called a hand-lay-up-moulding method or spray-up-moulding method has been conventionally adopted widely in production of the field of FRP (fiberglass reinforced plastic) especially the tub made from FRP, a bath unit floor, etc., These methods needed the man day of long time and many for producing the product of a piece. then, a sheet molding compound as what boils such productivity markedly and improves it. Thermosetting molding compounds, such as (it abbreviating to SMC hereafter) or a bulk molding compound (it abbreviates to BMC hereafter), are developed, and the heating-compression-molding method using this is adopted widely now.

[0003]However, in the heating compression molding of SMC only using a thermosetting molding compound, or BMC, the color of the whole mold goods becomes what was restricted to the single color, and if it is red, for example, the whole mold goods can produce only a red thing, but the obtained mold goods have the difficulty that the flexibility of a pattern and color is narrowed. Of course, if post processing, such as printing and paint, is performed to mold goods, it is possible to add the design which has a proper pattern or color, but it is necessary to add the process of complicated post processing in this case, and productivity falls further.

[0004]Then, the method of carrying out insert molding of the decorating sheet for adding the design which has a desired pattern or color to mold goods as a method of carrying out decoration to these FRP products is proposed. For example, the method of making a decorating sheet and a molding material unify and carrying out the decoration of the mold goods is proposed by arranging on SMC the decorating sheet which prints a desired encaustic handle to substrates, such as glass fabrics, a fiberglass mat, a nonwoven fabric, and textile fabrics, in a metallic mold in piles, and performing heating compression molding.

[0005]Heating compression molding is performed for SMC in piles on the decorating sheet which makes thermosetting resin come to impregnate the titanium paper which printed the desired encaustic handle, and the method of obtaining a mold decorating article is indicated by JP,H5-285973,A.

[0006]

[Problem(s) to be Solved by the Invention]However, in the above conventional heating-compression-molding methods, in the case of shape in which a product carries out an embossed surface owner to the surface, it was easy to produce a crevice between the uneven part of a

metallic mold, and the decorating sheet, and, thereby, there was a fault that the pitch of SMC flowed into the surface side of a decorating sheet. Therefore, according to the conventional method, it is able for shaping efficiency to correct and to consider it as a product very bad, about the comparatively minor thing which has a poor influx, but. Since handicraft is performing this correcting work, a help and time are required and it has the fault that cost becomes very high as total.

[0007] This invention is made that the above-mentioned fault should be canceled, and is a thing. The purpose is to provide the manufacturing method of the mold decorating article which faces fabricating the decorating sheet molded laminate which has designs, such as a color, can prevent a pitch from flowing into the surface side of a decorating sheet, and generating of inferior goods does not produce easily.

[0008]

[Means for Solving the Problem] A manufacturing method of a mold decorating article by this invention is devised that the above-mentioned purpose should be attained, lay a decorating sheet on a bottom part which has an uneven part for product embossed surface formation on the upper surface, and a thermosetting molding compound is laid on this decorating sheet. By carrying out heating compression of these in the state where it inserted by bottom part and a punch, it is the method of manufacturing a mold decorating article, and smooth sections located in the upper surface of a bottom part at a periphery of the above-mentioned uneven part are provided, and it is characterized by laying an end of a decorating sheet in these smooth sections.

[0009] Hereafter, this invention is explained in detail.

[0010] The decorating sheet used for this invention refers to a sheet formed reinforcing material colored or printed. This decorating sheet can be suitably impregnated with a thermosetting resin composition. When impregnating with a thermosetting resin composition, the decoration surface in which this hardens within a mold and which is excellent in endurance etc. by hard can be obtained.

[0011] As the above-mentioned sheet formed reinforcing material, textile fabrics, a nonwoven fabric, etc. which comprised paper or glass fiber, and synthetic fibers (polyester, polypropylene, rayon, nylon, etc.) are mentioned.

[0012] As an example of this sheet formed reinforcing material, a titanium paper, an overlay paper, Paper of fine quality, a report grade paper, a groundwood paper, art paper, coat paper, a glass chop strand mat, They are a glass filament mat, a glass continuous mat, woven glass roving, a glass surface mat, polyester textile fabrics, nylon textile fabrics, a polyester nonwoven fabric, a polypropylene nonwoven, etc.

[0013] Metsuke amount of  $10\text{--}300\text{g/m}^2$ , textile fabrics which consist of inorganic fibers on the other hand, and a nonwoven fabric has [ metsuke amount of textile fabrics and a nonwoven fabric which consists of the above-mentioned paper and organic textiles ] common  $100\text{--}500\text{g/m}^2$ .

[0014] As an amount of being impregnated of a thermosetting resin composition to a sheet formed reinforcing material, when a thing of an organic system is used as a sheet formed reinforcing material, it is preferred to be blended so that it may become 30 to 70 % of the weight to weight after [ whole ] being impregnated of a sheet with which it was impregnated, and it is 40 to 60 % of the weight more preferably.

[0015] On the other hand, when a thing of an inorganic system is used as sheet reinforcement, as for the amount of being impregnated of a thermosetting resin composition, being blended is preferred so that it may become 10 to 50 % of the weight to weight after [ whole ] being impregnated of a sheet with which it was impregnated, and it is 20 to 40 % of the weight more preferably.

[0016] As for a decorating method of a sheet, printing, coloring, etc. are mentioned. Here, a printing method should just be conventionally based on various publicly known methods, and, specifically, a gravure printing method, an offset-printing method, a screen-stencil method, the Toppan Printing method, etc. are held. A method of using what what is necessary is just to have depended on a

method publicly known also as a coloring method, and was colored textiles with a color, etc. are mentioned.

[0017]In order to raise design nature, design materials, such as granular material which carried out crushing of the thermosetting resin mold goods to a sheet formed reinforcing material or a thermosetting resin composition, natural mica, coloring mica, kansuiseki, living rock powder, a shell, and a metal powder, paints, and a color may be added.

[0018]In this invention, in impregnating a decorating sheet with a thermosetting resin composition, As a thermosetting resin composition, it is usable in a constituent which uses various thermosetting resin, such as unsaturated polyester resin, epoxyacrylate resin, diallyl phthalate resin, melamine resin, urethane acrylate resin, and phenol resin, as the main ingredients.

[0019]In the above-mentioned thermosetting resin composition, a solvent or a copolymeric monomer may be added if needed. For example, in resin with high viscosity, in order to improve impregnating ability, a solvent etc. are added and viscosity is reduced. In reactant low resin, copolymeric monomers, such as various styrene, alpha-methylstyrene, divinylbenzene, vinyltoluene, diallyl phthalate, various acrylate monomer, and methacrylate monomers, can be added, and reactivity can be improved.

[0020]An addition of the above-mentioned copolymeric monomer is usually zero to 100 weight section to thermosetting resin 100 weight section.

[0021]Various bulking agents and an additive agent may be used for the above-mentioned thermosetting resin composition if needed. Specifically, adequate amount addition of internal release agents, such as polymerization inhibitor, such as polymerization initiators, such as bulking agents, such as calcium carbonate, alumina, and aluminium hydroxide, and organic peroxide, and paraben ZOKINON, and zinc stearate, an antifungal agent, an antiseptic, the antioxidant, etc. is carried out.

[0022]Resin impregnation to a sheet base material can be conventionally performed by a publicly known method. Namely, a method of immersing a sheet base material in a tub containing resin, for example, and resin being impregnated with, and pressing a substrate with a roll etc., dropping excessive resin, and drying in a drying furnace if needed, Or on a belt, a sheet base material is poured, it goes, resin is laid on it, and there are a method of pressing a substrate and going with a roll or a braid, etc.

[0023]In this invention, what is used can be conventionally used as various thermosetting molding compounds, such as SMC and BMC, as a thermosetting molding compound.

[0024]The example of preparation of a thermosetting molding compound is as follows. Namely, unsaturated polyester resin, epoxyacrylate resin, urethane acrylate resin, etc. are used as thermosetting resin, they are added by various fillers, a reinforcing member, additive agent, etc. if needed, and by a publicly known method conventionally. A thermosetting resin composition with gestalten, such as SMC or BMC, is prepared.

[0025]Although a manufacturing method of this invention is performed using the above materials, the concrete operations are as follows.

[0026]As a making machine used for this invention, it is conventionally usable in a publicly known press-forming machine. As a mold, it is conventionally usable in a publicly known metallic mold, a casting type, etc.

[0027]Generally as a form of a mold, a fluctuated type is used preferably. In this case, a moving mold and a bottom part are usually used for a punch as a cover half.

[0028]An uneven part for product embossed surface formation needs to be provided in the upper surface of a bottom part. It consists of a flow pattern, a grain pattern, embossing, a geometrical pattern, a masonry joint, etc. as this uneven part. Height of an uneven part is generally 2 mm or less. When height of an uneven part becomes high, there is a possibility that a decorating sheet may be torn. It is necessary to provide smooth sections in a peripheral part of this uneven part. Width of smooth sections is generally not less than 2 mm here. It will flow in, if width of smooth sections is too short, and a preventive effect becomes small.

[0029]After attaching the above-mentioned die to the above-mentioned making machine and heating to it at 80–180 \*\*, where a mold is opened, lamination installation of a decorating sheet and a molding material which are charges of a compression member is carried out into a mold at a position of the purpose.

[0030]And an end of a decorating sheet is laid in smooth sections of a bottom part. Under the present circumstances, it is preferred to lay a decorating sheet in smooth sections at least 1 mm or more. It will flow in, if small to less than 1 mm, and a preventive effect becomes small. Next, a molding material is laid on it.

[0031]Here, as for charge of a thermosetting molding compound, when a size of a decorating sheet carries out the decoration of the mold-goods entire surface now, it is preferred to charge a thermosetting molding compound somewhat smaller than a decorating sheet. When quite smaller than a decorating sheet, there is a possibility that a decorating sheet may be torn. When larger than a decorating sheet, there is a possibility of becoming easy to generate an influx.

[0032]When carrying out the decoration only of the part while on the surface of mold goods, it is preferred to lay a thermosetting molding compound somewhat smaller than a decorating sheet on a decorating sheet, and to lay a thermosetting material all over mold-goods \*\*\*\* on it. In charge of those other than this, there is a possibility that a tear of a decorating sheet and an influx of a thermosetting molding compound may occur.

[0033]Here, although it is common that printing or coloring considers it as a field given more mostly as for a field which lays a decorating sheet in a bottom part, necessity is accepted and the molding material side is not cared about as a field printed or colored.

[0034]Then, if a mold is opened and a product is unmolded after closing a mold, performing pressing for 30 seconds – 15 minutes by a pressure of 2 – 150 kg/cm<sup>2</sup> and stiffening a molded product, a laminated mold decorating article will be obtained.

[0035]Here, the above-mentioned compacting pressure is 2–150kg/cm<sup>2</sup>, and is 10–120kg/cm<sup>2</sup> suitably. When using a molding material like general-purpose SMC or BMC especially, it is preferred to consider it as 50 – 120 kg/cm<sup>2</sup>, and when using a molding material for low-pressure molding called what is called low-pressure SMC, it is preferred to consider it as 5 – 25 kg/cm<sup>2</sup>. When compacting pressure is too low, a molding material has the fault that sufficient mobility is hard to be obtained. Conversely, when too high, it becomes easy to follow degradation of a mold at the time of mass production, and neither of the cases is preferred.

[0036]

[Function]By providing the smooth sections located in the periphery of the uneven part for product embossed surface formation at the upper surface of a bottom part in the manufacturing method of this invention, and laying the end of a decorating sheet in these smooth sections, It becomes difficult to generate a crevice between a decorating sheet and the uneven part of a bottom part, therefore becomes difficult to generate the defect that the pitch of a molding material flows into a decorating sheet.

[0037]

[Example]Below, working example of this invention is described with reference to Drawings.

[0038]In this working example, as shown in drawing 1, the embossed surface (12) divided into the pars basilaris ossis occipitalis of the mold goods of the water proof bread (11) obtained by the method of this invention in a grid pattern by the masonry joint (13) of the narrow width and the smooth sections (14) of these peripheries were formed.

[0039]1. preparation of a making machine and a metallic mold -- next in drawing 2, the 800-t press-forming machine by Kawasaki Hydromechanics Corp. was used as a making machine. Punch (5) which fabricates water proof bread (117 cm x 87 cm) (11) and (refer to drawing 1) as a metallic mold And the bottom part (6) was prepared. Punch (5) Steam pipings (graphic display abbreviation) were embedded at both bottom parts (6).

[0040]And the uneven part for product embossed surface formation (2) which has 0.2 mm in

height, and the flat part for masonry joint formation (3) were provided in the upper surface of the bottom part (6) in all directions. The smooth sections (4) of 8-mm width were provided in the periphery of this uneven part (2).

[0041] This metallic mold was attached to the above-mentioned press-forming machine. The punch (5) was used as the moving mold and the bottom part (6) was used as the cover half. The guide pin for positioning (9) is provided in the side edge part of a bottom part (6) at upper part protrusion state, and the guide hole (10) is established in the punch (5) corresponding to this.

[0042] 2. The adjustment decorating sheet (8) of the decorating sheet was adjusted as follows.

[0043] 1) the adjustment (1) unsaturation polyester resin liquid (unsaturated polyester resin of an isophthalic acid system of the number average molecular weight 8300 [ about ] — acetone: — what was dissolved in the toluene mixed solvent (1:1).) of the resin liquid for being impregnated 35 % of the weight of solvent 100 weight section (2) polymerization initiator (tertiary butylperoxy benzoate) 1 weight-section above (1) (2) was mixed and stirred and it was considered as the resin liquid for being impregnated.

[0044] 2) The adjustment decorating sheet 1 of a decorating sheet (8) : titanium paper (0.1 mm in thickness.) 80g/m<sup>2</sup>, PM11P: After having cut what printed grain patterns to the Kohjin Co., Ltd. make in size of 78 cm x 108 cm, immersing this cutting piece into the above-mentioned resin liquid and impregnating with resin, the cutting piece was pressed with a roll, excessive resin was dropped, and the decorating sheet 1 was obtained. The weight percentage of the substrate (paper) in this decorating sheet was 50 % of the weight.

[0045] Decorating sheet 2: The decorating sheet 2 as well as the decorating sheet 1 was obtained except having used for cloth (the product made of nylon, 0.1 mm in thickness, 90g/m<sup>2</sup>, Toyobo Co., Ltd. make) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 45 % of the weight.

[0046] Decorating sheet 3: The decorating sheet 3 as well as the decorating sheet 1 was obtained except having used for the nonwoven fabric (Son Tara [ the product made from polyester, 0.36 mm in thickness, 40.7g/m<sup>2</sup>, and ] #8000: made by Du Pont-Toray) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 50 % of the weight.

[0047] Decorating sheet 4: The decorating sheet 4 as well as the decorating sheet 1 was obtained except having used for glass fabrics (0.25 mm in thickness, 200g/m<sup>2</sup>, a plain weave, WF230100BS6: made by Nitto Boseki Co., Ltd.) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 35 % of the weight.

[0048] Decorating sheet 5: The decorating sheet 5 as well as the decorating sheet 1 was obtained except having used for the fiberglass mat (0.30 mm in thickness, 300g/m<sup>2</sup>, MC300A104: made by Nitto Boseki Co., Ltd.) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 35 % of the weight.

[0049] Decorating sheet 6: The decorating sheet 6 as well as the sheet 1 was obtained except having used for the overlay paper (0.12 mm in thickness, 100g/m<sup>2</sup>: made by Kohjin Co., Ltd.) what printed grain patterns. The substrate (paper) content of the obtained decorating sheet was 45 % of the weight.

[0050] 3. The following were used as an adjustments forming material (7) of a molding material.

[0051] (1) unsaturation polyester resin liquid (dissolving unsaturated polyester resin of an isophthalic acid system of the number average molecular weight 2000 [ about ] in styrene — a thing.) 40 % of the weight of styrene concentration 70 weight section (2) polystyrene resin liquid (weight-average-molecular-weight about 95000 polystyrene resin) a what [ was dissolved in styrene ], and 65 % of the weight of styrene concentration 30 weight section (3) polymerization initiator (tertiary butylperoxy benzoate) 1 weight section (4) calcium-carbonate-powder (100: NS-day the east powdering shrine make) 120 weight section (5) color pigment (titanium oxide powder.) an SR-1: Sakai Chemical Industry Co., Ltd. make 6 weight section (6) thickener (magnesium oxide powders.) the mean particle diameter of about 3 micrometers, and

KYOWAMAGU 150:Kyowa Chemical Industry Co., Ltd. make 1 weight section (7) internal release agent (zinc stearate: made by Sakai Chemical Industry Co., Ltd.) 3 weight section (8) glass fiber (roving [ by the Asahi fiberglass company ]: -- what cut ER4630LBD166W in length of 25 mm.) Hereafter, it is (1) among the 70 weight-section above-mentioned composition materials abbreviated to GF. After mixing the composition material of - (7) and fully kneading, impregnate the glass fiber of (8) with the obtained kneaded material by the SMC manufacturing installation, and it ripens at 40 °C for 24 hours, The coloring (white) SMC molding material about 2 mm thick was obtained.

[0052]4. The forming process thus the obtained SMC molding material (7), and the decorating sheet (8) were fabricated as follows.

[0053](Working example 1) As shown in above-mentioned drawing 2, after heating the punch (5) at 140 °C and heating a bottom part (6) at 150 °C, it put on the bottom part (6) upper surface, using the above-mentioned decorating sheet 1 as a decorating sheet (8) so that the end (8a) of this might come on smooth sections (4). Five things which cut the above-mentioned SMC molding material (7) in size of 70 cm x 100 cm on it were charged. A punch (5) on 30 mm from the position in contact with SMC molding material in a second in 50 mm / s. \*\* Until it contacts the SMC molding material (7) from on 30 mm from the position in contact with the SMC molding material (7) in a second, in 10 mm / s. \*\* After fastening and closing a punch (5) at 2 mm/second in speed until it closed, after contacting the SMC molding material (7), pressing was performed for 240 seconds by the pressure of 70 kg/cm<sup>2</sup>. Then, as a punch (5) was opened and unmolded and it was shown in drawing 1, the mold decorating article of the water proof bread (11) with which the field (12) of an embossed pattern and the masonry joint (13) of the narrow width were given to the pars basilaris ossis occipitalis, and smooth sections (14) were formed in the periphery was obtained. This shaping was repeated 10 times and ten mold goods were obtained.

[0054](Working example 2-6) It fabricated like working example 1 except having used the decorating sheet (8) described in the following table, respectively.

[0055](Comparative examples 1-6) The decorating sheet was cut to 77 cm x 107 cm, and it fabricated like working example 1 except having put the decorating sheet on the bottom part so that the end of a decorating sheet might come on an embossed surface.

[0056]In each working example and a comparative example, like working example 1, shaping was repeated 10 times, respectively and ten mold goods were obtained.

[0057]5. In valuation method above-mentioned each working example and a comparative example, the existence of an influx of SMC was evaluated by viewing about the obtained mold goods.

[0058]

[Table 1]

実施例No.	1	2	3	4	5	6
加飾シート	1	2	3	4	5	6
不良品数 (流れ込み)	0	0	0	0	0	0
良品数	10	10	10	10	10	10

[Table 2]

比較例No.	1	2	3	4	5	6
加飾シート	1	2	3	4	5	6
不良品数 (流れ込み)	8	7	6	9	9	7
良品数	2	3	4	1	1	3

In each working example of this invention, there was no defect so that clearly from the result of above-mentioned Table 1 and 2, but there were many defective fractions in a comparative example.



[0059]

[Effect of the Invention] Since the manufacturing method of the mold decorating article by this invention is constituted as above, generating of inferior goods is \*\*\*\* and high shaping efficiency producing, and does so the effect that mold goods with a beautiful ornament can be manufactured easily.

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**TECHNICAL FIELD**

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**PRIOR ART**

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[0004]Then, the method of carrying out insert molding of the decorating sheet for adding the design which has a desired pattern or color to mold goods as a method of carrying out decoration to these FRP products is proposed. For example, the method of making a decorating sheet and a molding material unify and carrying out the decoration of the mold goods is proposed by arranging on SMC the decorating sheet which prints a desired encaustic handle to substrates, such as glass fabrics, a fiberglass mat, a nonwoven fabric, and textile fabrics, in a metallic mold in piles, and performing heating compression molding.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention]Since the manufacturing method of the mold decorating article by this invention is constituted as above, generating of inferior goods is \*\*\*\* and high shaping efficiency producing, and does so the effect that mold goods with a beautiful ornament can be manufactured easily.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention]However, in the above conventional heating-compression-molding methods, in the case of shape in which a product carries out an embossed surface owner to the surface, it was easy to produce a crevice between the uneven part of a metallic mold, and the decorating sheet, and, thereby, there was a fault that the pitch of SMC flowed into the surface side of a decorating sheet. Therefore, according to the conventional method, it is able for shaping efficiency to correct and to consider it as a product very bad, about the comparatively minor thing which has a poor influx, but. Since handicraft is performing this correcting work, a help and time are required and it has the fault that cost becomes very high as total.

[0007]This invention is made that the above-mentioned fault should be canceled, and is a thing. The purpose is to provide the manufacturing method of the mold decorating article which faces fabricating the decorating sheet molded laminate which has designs, such as a color, can prevent a pitch from flowing into the surface side of a decorating sheet, and generating of inferior goods does not produce easily.

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**MEANS**

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[Means for Solving the Problem]A manufacturing method of a mold decorating article by this invention is devised that the above-mentioned purpose should be attained, lay a decorating sheet on a bottom part which has an uneven part for product embossed surface formation on the upper surface, and a thermosetting molding compound is laid on this decorating sheet. By carrying out heating compression of these in the state where it inserted by bottom part and a punch, it is the method of manufacturing a mold decorating article, and smooth sections located in the upper surface of a bottom part at a periphery of the above-mentioned uneven part are provided, and it is characterized by laying an end of a decorating sheet in these smooth sections.

[0009]Hereafter, this invention is explained in detail.

[0010]The decorating sheet used for this invention refers to a sheet formed reinforcing material colored or printed. This decorating sheet can be suitably impregnated with a thermosetting resin composition. When impregnating with a thermosetting resin composition, the decoration surface in which this hardens within a mold and which is excellent in endurance etc. by hard can be obtained.

[0011]As the above-mentioned sheet formed reinforcing material, textile fabrics, a nonwoven fabric, etc. which comprised paper or glass fiber, and synthetic fibers (polyester, polypropylene, rayon, nylon, etc.) are mentioned.

[0012]As an example of this sheet formed reinforcing material, a titanium paper, an overlay paper, Paper of fine quality, a report grade paper, a groundwood paper, art paper, coat paper, a glass chop strand mat, They are a glass filament mat, a glass continuous mat, woven glass roving, a glass surface mat, polyester textile fabrics, nylon textile fabrics, a polyester nonwoven fabric, a polypropylene nonwoven, etc.

[0013]Metsuke amount of  $10\text{--}300\text{g/m}^2$ , textile fabrics which consist of inorganic fibers on the other hand, and a nonwoven fabric has [ metsuke amount of textile fabrics and a nonwoven fabric which consists of the above-mentioned paper and organic textiles ] common  $100\text{--}500\text{g}[\text{m}]^2$ .

[0014]As an amount of being impregnated of a thermosetting resin composition to a sheet formed reinforcing material, when a thing of an organic system is used as a sheet formed reinforcing material, it is preferred to be blended so that it may become 30 to 70 % of the weight to weight after [ whole ] being impregnated of a sheet with which it was impregnated, and it is 40 to 60 % of the weight more preferably.

[0015]On the other hand, when a thing of an inorganic system is used as sheet reinforcement, as for the amount of being impregnated of a thermosetting resin composition, being blended is preferred so that it may become 10 to 50 % of the weight to weight after [ whole ] being impregnated of a sheet with which it was impregnated, and it is 20 to 40 % of the weight more preferably.

[0016]As for a decorating method of a sheet, printing, coloring, etc. are mentioned. Here, a printing method should just be conventionally based on various publicly known methods, and, specifically, a gravure printing method, an offset-printing method, a screen-stencil method, the Toppan Printing method, etc. are held. A method of using what what is necessary is just to have depended on a

method publicly known also as a coloring method, and was colored textiles with a color, etc. are mentioned.

[0017]In order to raise design nature, design materials, such as granular material which carried out crushing of the thermosetting resin mold goods to a sheet formed reinforcing material or a thermosetting resin composition, natural mica, coloring mica, kansuiseki, living rock powder, a shell, and a metal powder, paints, and a color may be added.

[0018]In this invention, in impregnating a decorating sheet with a thermosetting resin composition, As a thermosetting resin composition, it is usable in a constituent which uses various thermosetting resin, such as unsaturated polyester resin, epoxyacrylate resin, diallyl phthalate resin, melamine resin, urethane acrylate resin, and phenol resin, as the main ingredients.

[0019]In the above-mentioned thermosetting resin composition, a solvent or a copolymeric monomer may be added if needed. For example, in resin with high viscosity, in order to improve impregnating ability, a solvent etc. are added and viscosity is reduced. In reactant low resin, copolymeric monomers, such as various styrene, alpha-methylstyrene, divinylbenzene, vinyltoluene, diallyl phthalate, various acrylate monomer, and methacrylate monomers, can be added, and reactivity can be improved.

[0020]An addition of the above-mentioned copolymeric monomer is usually zero to 100 weight section to thermosetting resin 100 weight section.

[0021]Various bulking agents and an additive agent may be used for the above-mentioned thermosetting resin composition if needed. Specifically, adequate amount addition of internal release agents, such as polymerization inhibitor, such as polymerization initiators, such as bulking agents, such as calcium carbonate, alumina, and aluminium hydroxide, and organic peroxide, and paraben ZOKINON, and zinc stearate, an antifungal agent, an antiseptic, the antioxidant, etc. is carried out.

[0022]Resin impregnation to a sheet base material can be conventionally performed by a publicly known method. Namely, a method of immersing a sheet base material in a tub containing resin, for example, and resin being impregnated with, and pressing a substrate with a roll etc., dropping excessive resin, and drying in a drying furnace if needed, Or on a belt, a sheet base material is poured, it goes, resin is laid on it, and there are a method of pressing a substrate and going with a roll or a braid, etc.

[0023]In this invention, what is used can be conventionally used as various thermosetting molding compounds, such as SMC and BMC, as a thermosetting molding compound.

[0024]The example of preparation of a thermosetting molding compound is as follows. Namely, unsaturated polyester resin, epoxyacrylate resin, urethane acrylate resin, etc. are used as thermosetting resin, they are added by various fillers, a reinforcing member, additive agent, etc. if needed, and by a publicly known method conventionally. A thermosetting resin composition with gestalten, such as SMC or BMC, is prepared.

[0025]Although a manufacturing method of this invention is performed using the above materials, the concrete operations are as follows.

[0026]As a making machine used for this invention, it is conventionally usable in a publicly known press-forming machine. As a mold, it is conventionally usable in a publicly known metallic mold, a casting type, etc.

[0027]Generally as a form of a mold, a fluctuated type is used preferably. In this case, a moving mold and a bottom part are usually used for a punch as a cover half.

[0028]An uneven part for product embossed surface formation needs to be provided in the upper surface of a bottom part. It consists of a flow pattern, a grain pattern, embossing, a geometrical pattern, a masonry joint, etc. as this uneven part. Height of an uneven part is generally 2 mm or less. When height of an uneven part becomes high, there is a possibility that a decorating sheet may be torn. It is necessary to provide smooth sections in a peripheral part of this uneven part. Width of smooth sections is generally not less than 2 mm here. It will flow in, if width of smooth sections is too short, and a preventive effect becomes small.

[0029]After attaching the above-mentioned die to the above-mentioned making machine and heating to it at 80-180 \*\*, where a mold is opened, lamination installation of a decorating sheet and a molding material which are charges of a compression member is carried out into a mold at a position of the purpose.

[0030]And an end of a decorating sheet is laid in smooth sections of a bottom part. Under the present circumstances, it is preferred to lay a decorating sheet in smooth sections at least 1 mm or more. It will flow in, if small to less than 1 mm, and a preventive effect becomes small. Next, a molding material is laid on it.

[0031]Here, as for charge of a thermosetting molding compound, when a size of a decorating sheet carries out the decoration of the mold-goods entire surface now, it is preferred to charge a thermosetting molding compound somewhat smaller than a decorating sheet. When quite smaller than a decorating sheet, there is a possibility that a decorating sheet may be torn. When larger than a decorating sheet, there is a possibility of becoming easy to generate an influx.

[0032]When carrying out the decoration only of the part while on the surface of mold goods, it is preferred to lay a thermosetting molding compound somewhat smaller than a decorating sheet on a decorating sheet, and to lay a thermosetting material all over mold-goods \*\*\*\* on it. In charge of those other than this, there is a possibility that a tear of a decorating sheet and an influx of a thermosetting molding compound may occur.

[0033]Here, although it is common that printing or coloring considers it as a field given more mostly as for a field which lays a decorating sheet in a bottom part, necessity is accepted and the molding material side is not cared about as a field printed or colored.

[0034]Then, if a mold is opened and a product is unmolded after closing a mold, performing pressing for 30 seconds - 15 minutes by a pressure of 2 - 150 kg/cm<sup>2</sup> and stiffening a molded product, a laminated mold decorating article will be obtained.

[0035]Here, the above-mentioned compacting pressure is 2-150kg/cm<sup>2</sup>, and is 10-120kg/cm<sup>2</sup> suitably. When using a molding material like general-purpose SMC or BMC especially, it is preferred to consider it as 50 - 120 kg/cm<sup>2</sup>, and when using a molding material for low-pressure molding called what is called low-pressure SMC, it is preferred to consider it as 5 - 25 kg/cm<sup>2</sup>. When compacting pressure is too low, a molding material has the fault that sufficient mobility is hard to be obtained. Conversely, when too high, it becomes easy to follow degradation of a mold at the time of mass production, and neither of the cases is preferred.

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**OPERATION**

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[Function]By providing the smooth sections located in the periphery of the uneven part for product embossed surface formation at the upper surface of a bottom part in the manufacturing method of this invention, and laying the end of a decorating sheet in these smooth sections, It becomes difficult to generate a crevice between a decorating sheet and the uneven part of a bottom part, therefore becomes difficult to generate the defect that the pitch of a molding material flows into a decorating sheet.

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**EXAMPLE**

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[Example]Below, working example of this invention is described with reference to Drawings.

[0038]In this working example, as shown in drawing 1, the embossed surface (12) divided into the pars basilaris ossis occipitalis of the mold goods of the water proof bread (11) obtained by the method of this invention in a grid pattern by the masonry joint (13) of the narrow width and the smooth sections (14) of these peripheries were formed.

[0039]1. preparation of a making machine and a metallic mold -- next in drawing 2, the 800-t press-forming machine by Kawasaki Hydromechanics Corp. was used as a making machine. Punch (5) which fabricates water proof bread (117 cm x 87 cm) (11) and (refer to drawing 1) as a metallic mold And the bottom part (6) was prepared. Punch (5) Steam pipings (graphic display abbreviation) were embedded at both bottom parts (6).

[0040]And the uneven part for product embossed surface formation (2) which has 0.2 mm in height, and the flat part for masonry joint formation (3) were provided in the upper surface of the bottom part (6) in all directions. The smooth sections (4) of 8-mm width were provided in the periphery of this uneven part (2).

[0041]This metallic mold was attached to the above-mentioned press-forming machine. The punch (5) was used as the moving mold and the bottom part (6) was used as the cover half. The guide pin for positioning (9) is provided in the side edge part of a bottom part (6) at upper part protrusion state, and the guide hole (10) is established in the punch (5) corresponding to this.

[0042]2. The adjustment decorating sheet (8) of the decorating sheet was adjusted as follows.

[0043]1) the adjustment (1) unsaturation polyester resin liquid (unsaturated polyester resin of an isophthalic acid system of the number average molecular weight 8300 [ about ] -- acetone: -- what was dissolved in the toluene mixed solvent (1:1).) of the resin liquid for being impregnated 35 % of the weight of solvent 100 weight section (2) polymerization initiator (tertiary butylperoxy benzoate) 1 weight-section above (1) (2) was mixed and stirred and it was considered as the resin liquid for being impregnated.

[0044]2) The adjustment decorating sheet 1 of a decorating sheet (8) : titanium paper (0.1 mm in thickness.) 80g/m<sup>2</sup>, PM11P: After having cut what printed grain patterns to the Kohjin Co., Ltd. make in size of 78 cm x 108 cm, immersing this cutting piece into the above-mentioned resin liquid and impregnating with resin, the cutting piece was pressed with a roll, excessive resin was dropped, and the decorating sheet 1 was obtained. The weight percentage of the substrate (paper) in this decorating sheet was 50 % of the weight.

[0045]Decorating sheet 2: The decorating sheet 2 as well as the decorating sheet 1 was obtained except having used for cloth (the product made of nylon, 0.1 mm in thickness, 90g/m<sup>2</sup>, Toyobo Co., Ltd. make) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 45 % of the weight.

[0046]Decorating sheet 3: The decorating sheet 3 as well as the decorating sheet 1 was obtained except having used for the nonwoven fabric (Son Tara [ the product made from polyester, 0.36

mm in thickness,  $40.7\text{g/m}^2$ , and ] #8000: made by Du Pont-Toray) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 50 % of the weight.

[0047]Decorating sheet 4: The decorating sheet 4 as well as the decorating sheet 1 was obtained except having used for glass fabrics (0.25 mm in thickness,  $200\text{g/m}^2$ , a plain weave, WF230100BS6: made by Nitto Boseki Co., Ltd.) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 35 % of the weight.

[0048]Decorating sheet 5: The decorating sheet 5 as well as the decorating sheet 1 was obtained except having used for the fiberglass mat (0.30 mm in thickness,  $300\text{g/m}^2$ , MC300A104: made by Nitto Boseki Co., Ltd.) what printed grain patterns. The weight percentage of the substrate in this decorating sheet was 35 % of the weight.

[0049]Decorating sheet 6: The decorating sheet 6 as well as the sheet 1 was obtained except having used for the overlay paper (0.12 mm in thickness,  $100\text{g/m}^2$ : made by Kohjin Co., Ltd.) what printed grain patterns. The substrate (paper) content of the obtained decorating sheet was 45 % of the weight.

[0050]3. The following were used as an adjustments forming material (7) of a molding material.

[0051](1) unsaturation polyester resin liquid (dissolving unsaturated polyester resin of an isophthalic acid system of the number average molecular weight 2000 [ about ] in styrene -- a thing.) 40 % of the weight of styrene concentration 70 weight section (2) polystyrene resin liquid (weight-average-molecular-weight about 95000 polystyrene resin) a what [ was dissolved in styrene ], and 65 % of the weight of styrene concentration 30 weight section (3) polymerization initiator (tertiary butylperoxy benzoate) 1 weight section (4) calcium-carbonate-powder (100: NS-day the east powdering shrine make) 120 weight section (5) color pigment (titanium oxide powder.) an SR-1:Sakai Chemical Industry Co., Ltd. make 6 weight section (6) thickener (magnesium oxide powders.) the mean particle diameter of about 3 micrometers, and KYOWAMAGU 150:Kyowa Chemical Industry Co., Ltd. make 1 weight section (7) internal release agent (zinc stearate: made by Sakai Chemical Industry Co., Ltd.) 3 weight section (8) glass fiber (roving [ by the Asahi fiberglass company ]: -- what cut ER4630LBD166W in length of 25 mm.) Hereafter, it is (1) among the 70 weight-section above-mentioned composition materials abbreviated to GF. After mixing the composition material of - (7) and fully kneading, impregnate the glass fiber of (8) with the obtained kneaded material by the SMC manufacturing installation, and it ripes at 40 \*\* for 24 hours, The coloring (white) SMC molding material about 2 mm thick was obtained.

[0052]4. The forming process thus the obtained SMC molding material (7), and the decorating sheet (8) were fabricated as follows.

[0053](Working example 1) As shown in above-mentioned drawing 2, after heating the punch (5) at 140 \*\* and heating a bottom part (6) at 150 \*\*, it put on the bottom part (6) upper surface, using the above-mentioned decorating sheet 1 as a decorating sheet (8) so that the end (8a) of this might come on smooth sections (4). Five things which cut the above-mentioned SMC molding material (7) in size of 70 cm x 100 cm on it were charged. A punch (5) on 30 mm from the position in contact with \*\*SMC molding material in a second in 50 mm /. \*\* Until it contacts the SMC molding material (7) from on 30 mm from the position in contact with the SMC molding material (7) in a second, in 10 mm /. \*\* After fastening and closing a punch (5) at 2 mm/second in speed until it closed, after contacting the SMC molding material (7), pressing was performed for 240 seconds by the pressure of  $70\text{ kg/cm}^2$ . Then, as a punch (5) was opened and unmolded and it was shown in drawing 1, the mold decorating article of the water proof bread (11) with which the field (12) of an embossed pattern and the masonry joint (13) of the narrow width were given to the pars basilaris ossis occipitalis, and smooth sections (14) were formed in the periphery was obtained. This shaping was repeated 10 times and ten mold goods were obtained.

[0054](Working example 2-6) It fabricated like working example 1 except having used the decorating sheet (8) described in the following table, respectively.

[0055](Comparative examples 1-6) The decorating sheet was cut to 77 cm x 107 cm, and it fabricated like working example 1 except having put the decorating sheet on the bottom part so that the end of a decorating sheet might come on an embossed surface.

[0056]In each working example and a comparative example, like working example 1, shaping was repeated 10 times, respectively and ten mold goods were obtained.

[0057]5. In valuation method above-mentioned each working example and a comparative example, the existence of an influx of SMC was evaluated by viewing about the obtained mold goods.

[0058]

[Table 1]

実施例No.	1	2	3	4	5	6
加飾シート	1	2	3	4	5	6
不良品数 (流れ込み)	0	0	0	0	0	0
良品数	10	10	10	10	10	10

[Table 2]

比較例No.	1	2	3	4	5	6
加飾シート	1	2	3	4	5	6
不良品数 (流れ込み)	8	7	6	9	9	7
良品数	2	3	4	1	1	3

In each working example of this invention, there was no defect so that clearly from the result of above-mentioned Table 1 and 2, but there were many defective fractions in a comparative example.

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**DESCRIPTION OF DRAWINGS**

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[Brief Description of the Drawings]

[Drawing 1] It is an outline top view of the water proof bread manufactured by the method of this invention.

[Drawing 2] according to metallic mold in outline drawing of longitudinal section of device which enforces method of this invention shaping before -- \*\*\*\*\* (ing) -- \*\*\*\* .

[Description of Notations]

- 2: The uneven part for product embossed surface formation
- 3: The flat part for masonry joint formation
- 4: Smooth sections
- 5: Punch
- 6: Bottom part
- 7: Molding material (SMC)
- 8: Decorating sheet
- 8a: The end of a sheet
- 11: Water proof bread (mold goods)
- 12: Product embossed surface
- 13: Joint part
- 14: Smooth sections

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**\* NOTICES \***

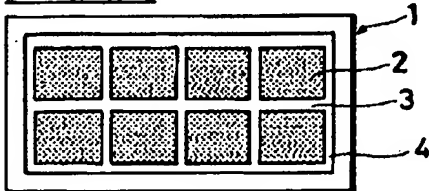
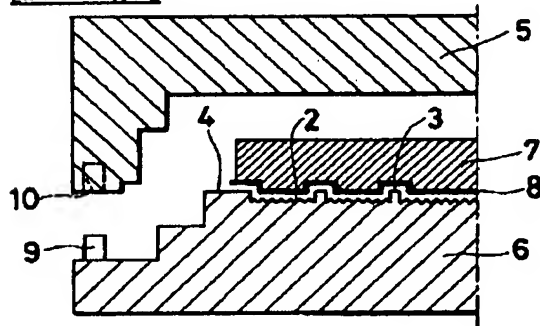
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**DRAWINGS**

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[Drawing 1][Drawing 2]

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105:06				

審査請求 未請求 請求項の数 1 O L (全 6 頁) 最終頁に続く

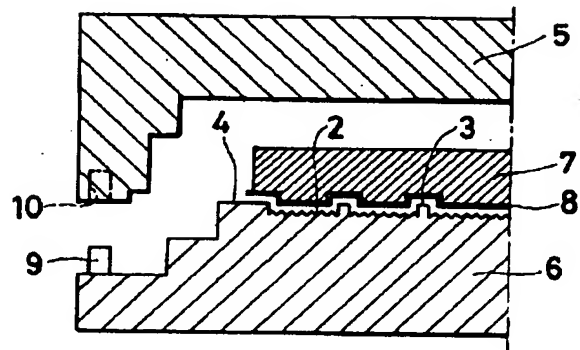
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(54) 【発明の名称】 加飾成形品の製造方法

(57) 【要約】

【構成】 本発明は、金型内に加飾シート8と熱硬化性成形材料7を重ねて配し、金型を締めて加熱圧縮成形を行なう加飾成形品の製造方法に関する。本発明の方法は、下型6の上面に、製品エンボス面形成用凹凸部2の外周に位置する平滑部4を設け、この平滑部4に加飾シート8の周縁部8aを載置することを特徴とする。

【効果】 自在な模様、色などの意匠を有する加飾シート積層成形品を成形するに際し、樹脂分が加飾シートの表面側に流れ込むのを防止することができて、不良品の発生が生じにくく、加飾成形品を効率よく生産することができる。



## 【特許請求の範囲】

【請求項1】 製品エンボス面形成用凹凸部を上面に有する下型の上に、加飾シートを載置し、この加飾シートの上に熱硬化性成形材料を載置して、これらを下型および上型で挟んだ状態で加熱圧縮することにより、加飾成形品を製造する方法であって、下型の上面に上記凹凸部の外周に位置する平滑部を設け、この平滑部に加飾シートの端部を載置することを特徴とする加飾成形品の製造方法。

## 【発明の詳細な説明】

## 【0001】

【産業上の利用分野】 本発明は、金型内に加飾シートと熱硬化性成形材料を重ねて配し、加熱圧縮成形を行なうことによって、加飾シートと成形材料を一体化させて、加飾シートによって所望の模様ないしは色彩を有する各種意匠を発現した加飾成形品を製造する方法に関する。

## 【0002】

【従来の技術】 従来、FRP（ガラス繊維強化プラスチック）の分野、特にFRP製バスタブ、バスユニット床等の生産においては、ハンドレイアップ成形法、あるいはスプレーアップ成形法と言われる方式が広く採用されて来たが、これらの方法は一個の製品を生産するのに長い時間と多くの工数を必要とした。そこで、これらの生産性を格段に改良するものとして、シート・モールドイング・コンパウンド（以下、SMCと略す）またはバルク・モールドイング・コンパウンド（以下、BMCと略す）等の熱硬化性成形材料が開発され、これを用いた加熱圧縮成形法が現在広く採用されている。

【0003】 しかしながら、熱硬化性成形材料だけを用いたSMCあるいはBMCの加熱圧縮成形では、得られた成形品は、成形品全体の色が単一色に限られたものとなり、例えば赤なら成形品全体が赤色のものしか生産できず、模様および色彩の自由度が狭められるという難点がある。勿論、成形品に印刷、塗装等の後加工を施せば、適宜の模様ないしは色彩を有する意匠を付加することは可能であるが、この場合には複雑な後加工の工程を付け加える必要があり、生産性がいっそう低下する。

【0004】 そこで、これらのFRP製品に加飾する方法として、成形品に所望の模様ないしは色彩を有する意匠を付加するための加飾シートをインサート成形する方法が提案されている。例えば、ガラスクロス、ガラスマット、不織布、織布等の基材に所望の模様柄を印刷してなる加飾シートをSMCを重ねて金型内に配し、加熱圧縮成形を行なうことによって、加飾シートと成形材料を一体化させて成形品を加飾する方法が提案されている。

【0005】 また、特開平5-285973号公報には、所望の模様柄を印刷したチタン紙に熱硬化性樹脂を含浸させてなる加飾シートの上にSMCを重ねて加熱圧縮成形を行ない、加飾成形品を得る方法が開示されている。

## 【0006】

【発明が解決しようとする課題】 しかしながら、上記のような従来の加熱圧縮成形方法においては、製品がその表面にエンボス面有するような形状の場合には、金型の凹凸部と加飾シートとの間に隙間が生じやすく、これにより、SMCの樹脂分が加飾シートの表面側に流れ込むという欠点があった。従って従来法によれば、成形効率が非常に悪く、また流れ込み不良の比較的軽微なものについては、修正を施して製品とすることも可能である

10 が、この修正作業は、手作業により行なっているため、人手と時間を要し、トータルとしてコストが非常に高くなるという欠点を有する。

【0007】 本発明は、上記欠点を解消すべくなされたものであり、自在な模様、色などの意匠を有する加飾シート積層成形品を成形するに際し、樹脂分が加飾シートの表面側に流れ込むのを防止することができて、不良品の発生が生じにくい加飾成形品の製造方法を提供することを目的とする。

## 【0008】

20 【課題を解決するための手段】 本発明による加飾成形品の製造方法は、上記目的を達成すべく工夫されたものであり、上面に製品エンボス面形成用凹凸部を有する下型の上に、加飾シートを載置し、この加飾シートの上に熱硬化性成形材料を載置して、これらを下型および上型で挟んだ状態で加熱圧縮することにより、加飾成形品を製造する方法であって、下型の上面に上記凹凸部の外周に位置する平滑部を設け、この平滑部に加飾シートの端部を載置することを特徴としている。

【0009】 以下、本発明を詳細に説明する。

30 【0010】 本発明に用いる加飾シートとは、着色あるいは印刷されたシート状補強材をいう。この加飾シートには、適宜、熱硬化性樹脂組成物を含浸させることができる。熱硬化性樹脂組成物を含浸させた場合には、型内にてこれが硬化し、硬質で耐久性などに優れる加飾表面を得ることができる。

【0011】 上記シート状補強材としては、紙あるいはガラス繊維、合成繊維（ポリエステル、ポリプロピレン、レーヨン、ナイロン等）から構成された織布、不織布などが挙げられる。

40 【0012】 このシート状補強材の具体例としては、チタン紙、オーバーレー紙、上質紙、中質紙、更紙、アート紙、コート紙、ガラスチョップストランドマット、ガラスフィラメントマット、ガラスコンティニアスマット、ガラスロービングクロス、ガラスサーフェイスマット、ポリエステル織布、ナイロン織布、ポリエステル不織布、ポリプロピレン不織布などである。

【0013】 上記紙、有機繊維からなる織布、不織布の目付量は、 $10 \sim 300 \text{ g/m}^2$ 、一方無機繊維からなる織布、不織布の目付量は $100 \sim 500 \text{ g/m}^2$ が一般的である。



【0014】シート状補強材への熱硬化性樹脂組成物の含浸量としては、シート状補強材として有機系のものを用いた場合には、含浸したシートの含浸後の全体の重量に対して30～70重量%となるように配合されることが好ましく、より好ましくは40～60重量%である。

【0015】一方、シート補強材として無機系のものを用いた場合には、熱硬化性樹脂組成物の含浸量は、含浸したシートの含浸後の全体の重量に対して10～50重量%となるように配合されることが好ましく、より好ましくは20～40重量%である。

【0016】シートの加飾方法は印刷、着色などが挙げられる。ここで、印刷方法は、従来公知の各種方法によればよく、具体的には、グラビア印刷方式、オフセット印刷方式、スクリーン印刷方式、凸版印刷方式などが挙げられる。また着色方法としても公知の方法によればよく、例えば繊維に染料で着色したものを用いる方法などが挙げられる。

【0017】また、意匠性を向上させるために、シート状補強材あるいは熱硬化性樹脂組成物に、熱硬化性樹脂成形品を粗砕した粒状物、天然雲母、着色雲母、寒水石、天然石粉、貝殻、金属粉などの柄材、顔料、染料を加えても良い。

【0018】本発明において、加飾シートに熱硬化性樹脂組成物を含浸させる場合には、熱硬化性樹脂組成物としては、不飽和ポリエステル樹脂、エポキシアクリレート樹脂、ジアリルフタレート樹脂、メラミン樹脂、ウレタンアクリレート樹脂、フェノール樹脂等の各種熱硬化性樹脂を主成分とする組成物が使用可能である。

【0019】上記熱硬化性樹脂組成物には、必要に応じて、溶剤、あるいは共重合性モノマー等を添加しても良い。例えば粘度の高い樹脂においては、含浸性を改良するために溶剤などを添加して粘度を低下させる。また反応性の低い樹脂においては、スチレン、 $\alpha$ -メチルスチレン、ジビニルベンゼン、ビニルトルエン、ジアリルフタレート、各種アクリレートモノマー、各種メタクリレートモノマーなどの共重合性モノマーを添加して反応性を改良することができる。

【0020】上記共重合性モノマーの添加量は、通常、熱硬化性樹脂100重量部に対して0～100重量部である。

【0021】また、上記熱硬化性樹脂組成物には、必要に応じて、各種充填剤、添加剤を用いても良い。具体的には、炭酸カルシウム、アルミナ、水酸化アルミニウム等の充填剤、有機過酸化化物等の重合開始剤、パラベンゾキノン等の重合禁止剤、ステアリン酸亜鉛等の内部離型剤、防かび剤、防腐剤、酸化防止剤などが適量添加される。

【0022】シート基材への樹脂含浸は、従来公知の方法により行なうことができる。即ち、例えば、樹脂の入った槽にシート基材を浸漬して樹脂を含浸し、ロール等

で基材を押圧して余分な樹脂を落とし、必要に応じて乾燥炉において乾燥する方法、あるいは、ベルトの上でシート基材を流して行き、その上に樹脂を載置し、ロールまたはブレード等で基材を押圧して行く方法等がある。

【0023】本発明において、熱硬化性成形材料としては、従来よりSMC、BMC等の各種熱硬化性成形材料として使用されているものを用いることができる。

【0024】熱硬化性成形材料の調製例は、つぎのとおりである。すなわち、熱硬化性樹脂として不飽和ポリエステル樹脂、エポキシアクリレート樹脂、ウレタンアクリレート樹脂等が用いられ、必要に応じて各種充填材、補強材、添加剤等が加えられ、従来公知の方法により、SMCあるいはBMC等の形態を持つ熱硬化性樹脂組成物が調製される。

【0025】本発明の製造方法は、上記のような材料を用いて行なわれるが、その具体的操作は、以下のとおりである。

【0026】本発明に用いる成形機としては、従来公知のプレス成形機が使用可能である。また型としては、従来公知の、金型、鋳物型等が使用可能である。

【0027】また型の形式としては、一般的には上下型が好ましく用いられる。この場合、通常は上型を可動型、下型を固定型として用いる。

【0028】下型の上面には、製品エンボス面形成用凹凸部が設けられている必要がある。この凹凸部としては例えば、流れ模様、石目模様、エンボス、幾何学模様、目地等からなる。凹凸部の高さは、一般的には2mm以下である。凹凸部の高さが高くなると加飾シートが破れるおそれがある。またこの凹凸部の外周部には、平滑部を設ける必要がある。ここで平滑部の幅は、一般的には2mm以上である。平滑部の幅が短すぎると流れ込み防止効果が小さくなる。

【0029】上記の成形機に、上記成形成型を取り付け、80～180℃に加熱した後、型を開いた状態で、型内に、被圧縮材料である加飾シートと成形材料をその目的の位置に積層載置する。

【0030】そして、加飾シートの端部を、下型の平滑部に載置する。この際、加飾シートを平滑部に少なくとも1mm以上載置するのが好ましい。1mm未満に少ないと流れ込み防止効果が小さくなる。つぎに、その上に成形材料を載置する。

【0031】ここで、熱硬化性成形材料のチャージは、加飾シートの大きさが、成形品表面全面をこれにて加飾する場合には、加飾シートより少し小さい熱硬化性成形材料をチャージするのが好ましい。加飾シートよりかなり小さいと加飾シートが破れるおそれがある。また加飾シートより大きいと流れ込みが発生しやすくなる恐れがある。

【0032】また成形品表面のうち一部のみを加飾する場合には、加飾シートより少し小さい熱硬化性成形材料

を加飾シートの上に載置し、その上に成形品ほぼ全面に熱硬化性材料を載置するのが好ましい。これ以外のチャージでは、加飾シートの破れ、熱硬化性成形材料の流れ込みが発生する恐れがある。

【0033】またここで、加飾シートを下型に載置する面は、印刷あるいは着色がより多く施された面とするのが普通であるが、必要に応じて、成形材料側を印刷あるいは着色した面としても構わない。

【0034】その後、型を締め切り、 $2 \sim 150 \text{ kg/cm}^2$  の圧力で30秒～15分間加圧成形を行ない、被成形物を硬化させた後、型を開け、製品を脱型すれば、積層された加飾成形品が得られる。

【0035】ここで、上記成形圧力は、 $2 \sim 150 \text{ kg/cm}^2$  であり、好適には $10 \sim 120 \text{ kg/cm}^2$  である。特に、汎用のSMCあるいはBMCの様な成形材料を用いる場合には $50 \sim 120 \text{ kg/cm}^2$  とすることが好適であり、また、いわゆる低圧SMCと呼ばれる、低圧成形用の成形材料を用いる場合には、 $5 \sim 25 \text{ kg/cm}^2$  とすることが好適である。成形圧力が低すぎる場合には、成形材料が十分な流動性が得られにくいという欠点を有する。逆に高すぎる場合には、量産時の型の劣化が進みやすくなり、いずれの場合も好ましくない。

#### 【0036】

【作用】本発明の製造方法においては、下型の上面に、製品エンボス面形成用凹凸部の外周に位置する平滑部を設け、この平滑部に加飾シートの端部を載置することにより、加飾シートと下型の凹凸部との間に隙間が発生し難くなり、従って加飾シートに成形材料の樹脂分が流れ込むといった不良が発生し難くなる。

#### 【0037】

【実施例】以下に、本発明の実施例を、図面を参照して説明する。

【0038】この実施例では、図1に示すように、本発明の方法によって得られる防水パン(11)の成形品の底部に、細幅の目地(13)によって碁盤目状に仕切られたエンボス面(12)と、これらの外周の平滑部(14)とを形成した。

#### 【0039】1. 成形機および金型の準備

つぎに図2において、成形機としては、川崎油工社製の800トンプレス成形機を用いた。金型としては $117 \text{ cm} \times 87 \text{ cm}$ の防水パン(11) (図1参照)を成形する上型(5)、および下型(6)を準備した。上型(5)、下型(6)には、共に蒸気配管(図示略)を埋め込んだ。

【0040】そして、下型(6)の上面には、高さ0.2mmを有する製品エンボス面形成用凹凸部(2)と、目地形成用平坦部(3)を縦横に設けた。また該凹凸部(2)の外周には8mm幅の平滑部(4)を設けた。

【0041】この金型を上記プレス成形機に取り付けた。上型(5)を可動型とし、下型(6)を固定型とした。

なお、下型(6)の側縁部には、位置決め用のガイドピン(9)が上方突出状に設けられ、これに対応して上型(5)にガイド孔(10)が設けられている。

#### 【0042】2. 加飾シートの調整

加飾シート(8)は、以下のように調整した。

##### 【0043】1) 含浸用樹脂液の調整

(1) 不飽和ポリエステル樹脂液(数平均分子量約8300のイソフタル酸系の不飽和ポリエステル樹脂をアセトン：トルエン混合溶媒(1：1)に溶解したもの、溶剤35重量%)100重量部

(2) 重合開始剤(ターシャリーブチルパーオキシベンゾエート)1重量部

上記(1)、(2)を混合、攪拌し、含浸用樹脂液とした。

##### 【0044】2) 加飾シート(8)の調整

加飾シート1：チタン紙(厚さ0.1mm、 $80 \text{ g/m}^2$ 、PM11P：興人社製)に石目柄を印刷したものを $78 \text{ cm} \times 108 \text{ cm}$ の大きさに切り、この切断片を上記樹脂液中に浸漬して樹脂を含浸させた後、切断片をロールで押圧して余分な樹脂を落し、加飾シート1を得た。この加飾シート中の基材(紙)の重量割合は、50重量%であった。

【0045】加飾シート2：布(ナイロン製、厚さ0.1mm、 $90 \text{ g/m}^2$ 、東洋紡績社製)に石目柄を印刷したものをを用いた以外は加飾シート1と同様に加飾シート2を得た。この加飾シート中の基材の重量割合は、45重量%であった。

【0046】加飾シート3：不織布(ポリエステル製、厚さ0.36mm、 $40.7 \text{ g/m}^2$ 、ソントラ#8000：東レ・デュボン社製)に石目柄を印刷したものをを用いた以外は加飾シート1と同様に加飾シート3を得た。この加飾シート中の基材の重量割合は、50重量%であった。

【0047】加飾シート4：ガラスクロス(厚さ0.25mm、 $200 \text{ g/m}^2$ 、平織り、WF230100BS6：日東紡績社製)に石目柄を印刷したものをを用いた以外は加飾シート1と同様に加飾シート4を得た。この加飾シート中の基材の重量割合は、35重量%であった。

【0048】加飾シート5：ガラスマット(厚さ0.30mm、 $300 \text{ g/m}^2$ 、MC300A104：日東紡績社製)に石目柄を印刷したものをを用いた以外は加飾シート1と同様に加飾シート5を得た。この加飾シート中の基材の重量割合は、35重量%であった。

【0049】加飾シート6：オーバーレー紙(厚さ0.12mm、 $100 \text{ g/m}^2$ ：興人社製)に石目柄を印刷したものをを用いた以外はシート1と同様にして加飾シート6を得た。得られた加飾シートの、基材(紙)含有率は、45重量%であった。

##### 【0050】3. 成形材料の調整

成形材料(7)としては以下のものをを用いた。

【0051】(1) 不飽和ポリエステル樹脂液(数平均分子量約2000のイソフタル酸系の不飽和ポリエステル樹脂をスチレンに溶解したもの、スチレン濃度40重量%)70重量部

(2) ポリスチレン樹脂液(重量平均分子量約95000のポリスチレン樹脂を、スチレンに溶解したもの、スチレン濃度65重量%)30重量部

(3) 重合開始剤(ターシャリーブチルパーオキシベンゾエート)1重量部

(4) 炭酸カルシウム粉末(NS-100:日東粉化社製)120重量部

(5) 着色顔料(酸化チタン粉末、SR-1:堺化学工業社製)6重量部

(6) 増粘剤(酸化マグネシウム粉末、平均粒径約3 $\mu$ m、キョーワマグ150:協和化学工業社製)1重量部

(7) 内部離型剤(ステアリン酸亜鉛:堺化学工業社製)3重量部

(8) ガラス繊維(旭ファイバーグラス社製のロービング:ER4630LBD166Wを長さ25mmに切断したもの、以下、GFと略す)70重量部

上記配合材料のうち(1)~(7)の配合材料を混合し、十分に混練を行なった後、得られた混練物をSMC製造装置により(8)のガラス繊維に含浸させ、40℃にて24時間熟成して、厚み約2mmの着色(白色)SMC成形材料を得た。

#### 【0052】4. 成形方法

このようにして得られたSMC成形材料(7)および加飾シート(8)を、以下のように成形した。

【0053】(実施例1) 上記図2に示すように、上型

(5)を140℃、下型(6)を150℃に加熱した後、加\*30

\* 飾シート(8)として上記加飾シート1を用い、この端部(8a)が平滑部(4)上になるように、下型(6)上面に載せた。その上に上記SMC成形材料(7)を70cm×100cmの大きさに切ったものを5枚チャージした。上型(5)を、①SMC成形材料に接触する位置より30mm上まで50mm/秒で、②SMC成形材料(7)に接触する位置より30mm上からSMC成形材料(7)に接触するまで10mm/秒で、③SMC成形材料(7)に接触した後、締め切るまで2mm/秒の速度で上型(5)を締め、締め切った後70kg/cm<sup>2</sup>の圧力で240秒間加圧成形を行なった。その後、上型(5)を開いて脱型し、図1に示すように、底部にエンボス模様の面(12)と、細幅の目地(13)とが施され、かつ外周に平滑部(14)が形成された防水パン(11)の加飾成形品を得た。この成形を10回繰り返し、10個の成形品を得た。

【0054】(実施例2~6)それぞれ、下表に記す加飾シート(8)を用いた以外は、実施例1と同様に成形を行なった。

【0055】(比較例1~6)加飾シートを77cm×107cmに切断し、加飾シートの端部がエンボス面の上になるように加飾シートを下型に載せた以外は、実施例1と同様に成形を行なった。

【0056】各実施例および比較例では、実施例1と同様に、それぞれ10回ずつ成形を繰り返し、10個の成形品を得た。

#### 【0057】5. 評価方法

上記各実施例および比較例において、得られた成形品について、目視にてSMCの流れ込みの有無を評価した。

【0058】

【表1】

実施例No.	1	2	3	4	5	6
加飾シート	1	2	3	4	5	6
不良品数(流れ込み)	0	0	0	0	0	0
良品数	10	10	10	10	10	10

【表2】

比較例No.	1	2	3	4	5	6
加飾シート	1	2	3	4	5	6
不良品数(流れ込み)	8	7	6	9	9	7
良品数	2	3	4	1	1	3

上記の表1および表2の結果から明らかなように、本発明の各実施例においては、不良が無かったが、比較例においては、不良率が多いものであった。

【0059】

【発明の効果】本発明による加飾成形品の製造方法は以上のとおり構成されているので、不良品の発生が生じにくく、高い成形効率で、美しい装飾のある成形品を容易

に製造することができるという効果を奏する。

【図面の簡単な説明】

【図1】本発明の方法により製造された防水パンの概略平面図である。

【図2】本発明の方法を実施する装置の概略縦断面図で、金型による成形前の状態示している。

【符号の説明】

(6)

特開平9-11259

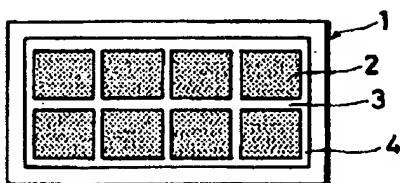
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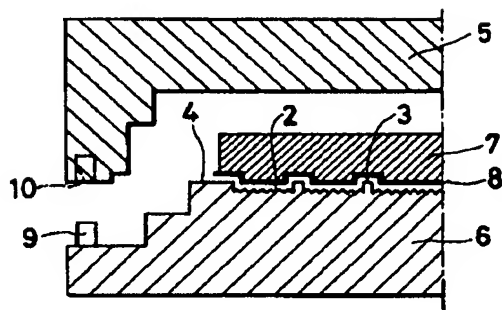
- 2 : 製品エンボス面形成用凹凸部
- 3 : 目地形成用平坦部
- 4 : 平滑部
- 5 : 上型
- 6 : 下型
- 7 : 成形材料 (SMC)

- \* 8 : 加飾シート
- 8 a : シートの端部
- 11 : 防水パン (成形品)
- 12 : 製品エンボス面
- 13 : 目地部
- \* 14 : 平滑部

【図1】



【図2】



フロントページの続き

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